IV. MITIGATION OBJECTIVES AND STRATEGIES

A. Developing Mitigation Strategies

1. Mitigation according to Plan Goals

Meaningful hazard mitigation requires a broad array of strategies. The Croton-on-Hudson Hazard Mitigation Committee considered mitigation strategies for each hazard. The strategies for mitigation were then reviewed to make sure they support the goals of this Hazard Mitigation Plan first identified in Section 1 Part B and Section II Part A. The goals are summarized below:

- Identify mitigation objectives for each hazard.
  Consider the following objectives for each hazard:
  a. Asses exposure to hazard event
  b. Increase the number of structures (new and old) that can withstand the impact of the hazard. Many buildings in the village were constructed when standards were less strict. The village hopes to increase resistance in both new and existing buildings around high risk areas.
  c. Improve awareness of the hazard. Enhancing awareness of hazardous materials will better prepare the community in case a hazardous materials event occurs.
  d. Enhance response and recovery. The village hopes to improvements current planning, training and equipment for the first responders.
  e. Determine the most effective means of reducing risk

- Determine strategies that will achieve objectives.
  Consider the following questions for the implementation of the strategies:
  a. Is the strategy appropriate for implementation in this area?
  b. Will the strategy effectively mitigate in an appropriate time period?
  c. Who will be responsible for implementation?
  d. Will political parties active in local government support strategies?
  e. Can the village government legally carry out the strategy?
  f. What impact will the strategy have on the environment?
  g. What are the relative implementation and maintenance costs?

- Evaluate the extent to which each strategy supports the goals of the Hazard Mitigation Plan by prioritizing the strategies according to the STAPLEE (Social, Technological, Administrative, Political, Legal, Economic, and Environmental) criteria for each hazard. Develop a potential project list based on a prioritized list of strategies. See section E for a prioritized list of potential projects.

- Complete a cost/benefit analysis for strategies.

2. Potential Mitigation Activities

The committee considered the threats to our community carefully and attempted to develop creative solutions that offer the greatest benefit. The committee evaluated and prioritizes the hazards based on the threat posed to the village. In many cases the committee opted to increase public awareness through government access

programming, online information, or distributed brochures. Public awareness is beneficial because of the ease of implementation and relative low cost. In addition, the committee determined that property owners have an obligation to prepare themselves and their property in case of disasters. Properly educated residents will be the best defense in the case of many natural disasters. In some instances, the committee felt aggressive action through renovation, policy change or other action would result in the greatest potential benefit. The committee took estimated costs into consideration when possible.

B. Mitigation Strategies

1. Hazardous Materials

The variety of hazardous materials and their potential heath risk to the village is a complex and evolving topic. The movement and storage of hazardous materials presents a threat to the community and emergency response personnel. Movement of hazardous materials through the transportation corridors in the village is difficult to regulate, but locations throughout the village that regularly use and store hazardous materials can be identified. The village should better identify the nature and location of materials in the community. Emergency personnel can use that information to determine the potential exposure to hazardous materials, and residents can be made aware of risks. Knowledge of what is kept at each facility prior to a hazardous event would permit emergency personnel to respond quickly with less risk.

a. Objective: Assess exposure to hazardous materials events.

Strategy: Develop a system to monitor storage and movement of hazardous materials. Keep system up to date by supplementing fire inspector reports with voluntary self-reporting.
Strategy: Identify storm drain outfalls near or along major transportation routes or known hazardous materials site and provide mitigation measures to prevent the conveyance of spilled hazardous materials into adjacent waterways.
Strategy: Study ability of Croton Pump Station to provide continuous operation during such an event.

b. Objective: Increase the number of structures that are able to withstand incidents associated with hazardous materials.

Strategy: Enforce compliance with New York State Building Codes. Consider retrofitting of existing critical facilities to withstand impacts associated with hazardous materials spills.
Strategy: Identify sensitive facilities within the transportation corridors and near known hazardous material sites. In the case of schools and office buildings, request evacuation and emergency plans.
Strategy: Ensure that hazardous material sites have in place proper spill mitigation and containment measures, and meet environmental review standards.
Strategy: Conduct inspections of sites with or vulnerable to hazardous materials.
Strategy: Conduct environmental review of property during construction and renovation.

c. Objective: Improve awareness of hazardous materials in the area.

Strategy: Provide information to residents and businesses regarding hazardous material risk and how to respond in the event a disaster occurs.
Strategy: Encourage residents of single and two-family homes to store and use hazardous materials in a safely.

d. Objective: Enhance response, recovery and preparedness.

Strategy: Install additional phone jacks in the Manager's office to enable use of the office as the EOC.
Strategy: Increase traffic enforcement in high risk regions.
Strategy: Consider renovations to village Police Headquarters.
Strategy: Provide emergency service teams and others unable to relocate during hazardous materials events with necessary protective equipment.

Table 6 – Hazardous Materials Strategy/Project Table

Hazardous Materials	
Strategy/Project	Priority
Monitoring system for storage and movement of hazardous materials	Moderate
Identify sensitive facilities within the hazardous materials corridors and near known hazardous material sites.	High
Conduct inspections of sites with hazardous materials	Low
Increase traffic enforcement in higher risk regions.	Low
Consider retrofitting of existing critical facilities to withstand impacts associated with hazardous materials spills.	Moderate
Prevent the conveyance of spilled hazardous materials into adjacent waterways	Moderate
Confirm ability of Croton Pump Station to provide continuous operation during event.	High
Link from Police and Fire Departments' web pages to county, state and federal emergency response sites.	High
Install additional phone jacks in the Manager's office to enable use of the office as the EOC.	High
Provide emergency service teams and others unable to relocate during hazardous materials events with necessary protective equipment.	High
Educate residents and businesses.	High
Ensure that hazardous material sites have in place proper spill mitigation and containment measures.	High
Training of emergency service providers.	Moderate
Renovate village Police Headquarters.	Low
Identify types of hazardous materials traveling on major transportation routes.	Low

2. Flooding, Nor'easter, Hurricane and Severe Storms

Severe weather related disasters are regular events in the area. The village has operating procedure for such events. The following objectives strive to enhance damage prevention before a storm and improve disaster relief and recovery strategies for during and after the storm.

a. **Objective: Asses exposure to severe weather and flooding.**

Strategy: Continue with Storm Water Drainage projects in problem areas of the village in order to diminish risk of flooding.

b. Objective: Increase the number of structures that can withstand the impact of severe weather and flooding.

Strategy: Remove the Department of Public Works Garage from flood and dam failure zone.
Strategy: Require all new facilities to be constructed according to New York State Building Code for resisting severe weather.
Strategy: Evaluate ways to minimize or decrease the number of structures susceptible to flooding either through floodplain development regulations, zoning, open space preservation, storm water management regulations, or coastal zone management regulations.
Strategy: Consider changes to the building code that reduce potential flood damage to existing or new construction in low areas.

c. Objective: Improve awareness.

Strategy: Provide information to residents and businesses regarding the risk of severe storms and flooding. Distribute information on damage prevention and emergency response before a disaster occurs.
Strategy: Develop links off of the Police and Fire Departments' web pages to county, state and federal emergency response sites to help residents prepare for hazardous events.

d. Objective: Enhance response, recovery and preparedness.

Strategy: Maintain a stock of sand bags to be used in a flooding event and store at the water station and DPW garage.
Strategy: Obtain materials and equipment for mitigating impact of hazard event and minimizing the discomfort of the public. Work with other municipalities or organizations that can supply aid. Assess need for food and water storage.
Strategy: Use resources provided by County level emergency response teams.
Strategy: Consider methods of maintaining electricity in designated locations.
Strategy: When possible, identify or provide advanced warning to residents if a storm presents particular risks (i.e. tides, snow on roof, snow shoveling).
Strategy: Encourage residents to react to severe weather in a safe and responsible way.

Table 7 – Flooding, Nor'easter, Hurricane & Other Storms Strategy/Project Table

Flooding, Nor'easter, Hurricane & Other Storms	
Strategy/Project	Priority
Remove the Department of Public Works Garage from flood and dam failure zone.	High
Encourage residents to react to severe weather in a safe and responsible way.	High
Continue with Storm Water Drainage projects in problem areas.	High
Evaluate ways to minimize or decrease the number of structures susceptible to flooding either through floodplain development regulations, zoning, open space preservation or coastal zone management regulations.	High
Provide information to residents and businesses regarding the risk of severe storms and flooding.	Moderate
Develop links off of the Police and Fire Departments' web pages to county, state and federal emergency response sites	Moderate
Obtain materials and equipment for mitigating impact of hazard event and minimizing the discomfort of the public.	Moderate
Consider methods of maintaining electricity is designated locations.	Moderate
Use resources provided by County level emergency response teams.	Low
Identify or provide advanced warning to residents if a storm presents particular risks.	Low

3. Fire, Explosion, and Structural Collapse

a. Objective: Asses exposure to fire, explosion and structural collapse

Strategy: Conduct inventory of buildings not meeting current NYS Building Code requirements.
Strategy: Conduct inventory of sites or facilities that may be prone or vulnerable to explosions.

b. Objective: Increase the number of structures that are more resistant to fire or collapse

Strategy: Consider incentives to encourage the retrofitting of existing buildings within the village fire limits to meet current NYS Building Code requirements.
Strategy: Encourage residents to install or replace batteries in smoke alarms.
Strategy: Consider requiring higher standards for fire preventing in new residences through building code adjustments.
Strategy: Consider other methods of protecting buildings in the village from fire, explosion, or structural collapse, including regular maintenance of the structure and of the surrounding property.

c. Objective: Improve awareness regarding the fire and structural collapse.

Strategy: Enhance fire safety awareness information and make such information more available to local homeowners and businesses via village website and Cable TV.
Strategy: Enhance building and fire inspections to ensure compliance with applicable building code and fire safety laws. Promote voluntary inspections of buildings, where not required by law, with amnesty provision.

d. Objective: Enhance hazard response, recovery and preparedness.

Strategy: Complete renovations of village Police Headquarters.
Strategy: Encourage and enhance training of Fire Department personnel.
Strategy: Continue to evaluate roads for emergency vehicle access.

Table 8 – Fire, Explosions, Earthquake, Tornado, Structural Collapse Strategy/Project Table

Fire, Explosions, Earthquake, Tornado, Structural Collapse	
Strategy/Project	Priority
Enhance training of Fire Department personnel	High
Enhance fire safety awareness information	High
Evaluate roads for emergency vehicle access	Moderate
Conduct inventory of buildings not meeting current NYS Building Code requirements	Moderate
Consider incentives to encourage the retrofitting of existing buildings within the village Fire Limits to meet current NYS Building Code requirements	Moderate
Consider requiring higher standards for fire preventing in new residences	Moderate
Renovate Village Police Headquarters	Low
Enhance building and fire inspections to ensure compliance with applicable building code and fire safety laws	Low
Conduct inventory of sites or facilities that may be prone or vulnerable to explosions.	Low

4. Dam Failure

The village does not have control over the maintenance, regulation or protection of the New Croton Dam or the New York City Water Supply. The village is at risk because of its proximity to the dam and Croton River's proximity to a large neighborhood of densely populated residential homes in the village. The dam may be a target of terrorism. The village has a Dam Failure Emergency Plan, but further mitigating strategies can be explored. Complete dam failure without warning is unlikely.

The Dam Failure Plan identifies homes and businesses that would be affected depending on the amount of damage the dam withstands. Evaluate accuracy of the Dam Failure Plan. The plan was completed in January 1989. Modern technology in

emergency response may draw different conclusions, especially in maps of impact areas.

a. Objective: Assess exposure.

Strategy: Hiring a consulting firm to determine accuracy of plan. Revise the plan.
Strategy: Consider developing an evacuation plan to remove residents from the area. Identify routes and destination shelters or facilities.

b. Objective: Increase the number of structures that can withstand a dam failure.

Strategy: Inventory buildings in risk area and evaluate current Dam Failure Emergency Action Plan for accuracy.
Strategy: Take steps to prevent new construction within the Dam Failure zone indicated by the plan.

c. Objective: Increase awareness regarding dam failure.

Strategy: Consider initial notification of homes at risk with tax bill.
Strategy: Consider investing in Reverse 911 to facilitate rapid notification of at risk residents.
Strategy: Inform residents of risk factor based on location of property. Create an evacuation plan. Send information with tax bill or make available on village website.

d. Objective: Enhance hazard response, recovery and preparedness.

Strategy: Complete renovations of Police Headquarters.
Strategy: Enhance training of Fire Department personnel.
Strategy: Work with State and County officials. The dam and the New York City Water Supply are regulated and protected by the DEC.
Strategy: Evaluate roads for emergency vehicle access.
Strategy: Work with the Red Cross to set up evacuation shelter.

Table 9 – Dam Failure, Flooding Strategy/Project Table

Dam Failure, Flooding	
Strategy/Project	Priority
Enhance training of Fire Department personnel	High
Work with the Red Cross to set up evacuation shelter	High
Consider investing in Reverse 911 to facilitate rapid notification of at risk residents	High
Work with State and County officials and the New York City Water Supply	High
Evaluate roads for emergency vehicle access	Moderate
Inventory buildings in risk area	Moderate
Hiring a consulting firm to determine accuracy of plan	Moderate
Consider developing an evacuation plan to remove residents from the area	Moderate

Consider initial notification of homes at risk with tax bill	Moderate
Inform residents of risk factor based on location of property	Low
Renovate Village Police Headquarters	Low

5. Extreme Temperatures

Extended periods of extreme heat or extreme cold are a regular occurrence in the Lower Hudson Valley Region. The village should implement strategies that educate and warn citizens of possible risks related to periods of extreme temperatures. In addition to prevention strategies the village should improve its ability to respond to increased demand for medical assistance during periods of extreme temperatures. Hazard Mitigation Committee determined that the village is at risk. The large population of senior citizens is especially a concern of the Committee. History indicates the extreme highs in the summer lead to energy shortages and power outages, while extreme lows during the winter threaten private property and utilities.

a. Objective: Asses exposure.

Strategy: Study history of hazard events related to extreme temperatures in the area.

b. Objective: Increase the number of structures that can withstand extreme temperatures.

Strategy: Develop a plan to provide backup power to critical facilities.
Strategy: Encourage residents to install or replace batteries in smoke alarms.

c. Objective: Increase awareness regarding health and safety during periods of extreme temperatures.

Strategy: Include links on the village web site to weather and health watch web sites and to the County and State's pages on health.
Strategy: Inform residents of risks. Outline steps to minimize the impact.
Strategy: Take steps to ensure that children and older residents, who are more susceptible to heat and cold, are aware of risks. When possible provide space in Public buildings for those at risk.

d. Objective: Enhance hazard response, recovery and preparedness.

Strategy: Enhance training of Police, Fire and EMT personnel.

Table 10 – Extreme Temperatures Strategy/Project Table

Extreme Temperatures	
Strategy/Project	Priority
Enhance training of Fire Department personnel	High
Inform residents of risks	High

Include links on the village web site to weather and health watch web sites and to the County and State's pages on health	Moderate

6. Earthquake, Landslide and Tornado

Earthquakes are rare events in the village. Landslides caused by earthquakes are also rare, however long periods of heavy rain can cause significant landslides because of the steep slopes and sandy soil in the area.

a. Objective: Assess risk.

Strategy: Conduct a study of existing structures in the village to determine susceptibility.
Strategy: Consider structural risk in village, especially in steep slope regions.

b. Objective: Increase the number of structures that can withstand the impact of the hazard

Strategy: Conduct a study of existing structures in the village to determine susceptibility of existing building stock.
Strategy: Continue to enforce steep slopes regulations. Make steep slopes exceptions more difficult to obtain.
Strategy: Pursue options to acquire open space.
Strategy: Require new construction to conform to the New York State Building Code.

c. Objective: Raise awareness about the importance of proper maintenance of steep slopes.

Strategy: Include information about landslides and how to minimize risk on the village web site.
Strategy: Strictly enforce steep slopes laws and codes.

d. Objective: Enhance hazard response, recovery and preparedness.

Strategy: Complete renovations of Police Headquarters.
Strategy: Enhance training of Fire Department personnel.
Strategy: Evaluate roads for emergency vehicle access.

Table 11 – Earthquake, Landslide Strategy/Project Table

Earthquake, Landslide	
Strategy/Project	Priority
Enhance training of Fire Department personnel	High
Consider structural risk in village, especially in steep slope regions	High
Strictly enforce steep slopes laws and codes	High
Evaluate roads for emergency vehicle access	Moderate
Include information about landslides and how to minimize risk on the village web site	Moderate

Renovate Village Police Headquarters	Low

7. Terrorism

The village should implement strategies that identify and reduce the vulnerability to terrorist attacks. The village will need to monitor changes in conditions that may make the village more vulnerable to these hazard events. Reducing risk of terrorism requires partnerships with adjacent communities, local businesses, schools and federal, state and county transportation and security agencies.

a. Objective: Assess exposure.

Strategy: Conduct discrete inventory of potential terrorist targets within and near the village and appropriate security measures.

b. Objective: Increase the number of structures that can withstand Terrorist Events.

Strategy: Improve security measures at emergency response facilities and other sensitive facilities.
Strategy: Monitor changes in flight paths to Westchester County or other regional airports that may impact the village.
Strategy: Work with regional emergency management offices to remain aware or heightened terrorist threats to the village. Increase security when necessary.

c. Objective: Improve awareness

Strategy: Make information available about risk of terrorism.

d. Objective: Enhance response and recovery

Strategy: Complete renovations of Police Headquarters.
Strategy: Enhance training of Fire Department personnel.
Strategy: Evaluate roads for emergency vehicle access.

Table 12 – Terrorism Strategy/Project Table

Terrorism	
Strategy/Project	Priority
Conduct discrete inventory of potential terrorist targets within and near the village and appropriate security measures	High
Enhance training of Fire Department personnel	High
Evaluate roads for emergency vehicle access	Moderate
Improve security measures at emergency response facilities and other sensitive facilities	Moderate
Renovate Village Police Headquarters	Low

8. Hailstorm, Ice Storm, Severe Winter Weather

a. Objective: Assess exposure to hazard event

Strategy: Conduct a study of existing village facilities to determine risk during severe winter weather.
Strategy: Conduct a study of existing structures in the village to determine risk during severe winter weather.

b. Objective: Increase the number of structures that can withstand the impact of Severe Winter Weather and other storms.

Strategy: Update code in order to increase number of structures that can withstand the impact of the hazard.
Strategy: Ensure that all structures, new and old, can withstand accumulation of snow and ice.
Strategy: Remove trees that threaten utilities and communication lines.
Strategy: Encourage installation of smoke detectors.

c. Objective: Improve awareness within community of risk mitigation and prevention tactics.

Strategy: Post information on the internet and make pamphlets available regarding public heath and safety.
Strategy: Post information on the internet and make pamphlets available regarding protection of private property against severe winter weather.

d. Objective: Enhance response and recovery.

Strategy: Plan access to public works garage, police station, fire houses and EOC for disaster management.

Table 13 – Hail, Ice Storm, Severe Winter Weather Strategy Project

Hail, Ice Storm, Severe Winter Weather	
Strategy/Project	Priority
Post information on the internet and make informational pamphlets available.	High
Plan access to public works garage, police station, fire houses and EOC for disaster management.	High
Remove trees that threaten utilities and communication lines.	Moderate
Update code.	Low

9. Drought and Water Supply Failure

The village should work with utility service provides and local group facilities such as schools, senior and medical providers to increase the resistance to drought, water supply failure and extreme temperatures. Implementing conservation practices would reduce vulnerability to these hazard events.

The village should work to increase awareness of drought, water supply failure and extreme temperature hazards. Providing information regarding conservation

practices can reduce vulnerability to these hazard events. More training of emergency personnel is an additional mitigation measure that could be implemented.

a. Objective: Assess Vulnerability

Strategy: Identify vulnerabilities in water supply system leaks, and continue with regular improvements.
Strategy: Ensure that critical facilities in the village have appropriate backup generation capabilities.

b. Objective: Increase the number of structures (new and old) that can withstand the impact of drought and water supply failure

Strategy: Consider amending local legislation to encourage greater water conservation practices in non- and drought emergency times.
Strategy: Improve coordination with local medical care facilities to determine whether additional support is necessary in the event of extreme temperatures or problem with the water supply.
Strategy: Improve coordination with local and regional power service providers.

c. Objective: Improve awareness of hazards and possible mitigation strategies.

Strategy: Provide information to residents and businesses regarding water conservation practices.
Strategy: Make free pamphlets on drought and extreme temperatures available at the village office.

d. Objective: Enhance response and recovery.

Strategy: Enhance training and equipment of emergency service personnel

Table 14 – Drought, Water Supply Failure & Extreme Temps. Strategy/Projects Table

Drought, Water Supply Failure & Extreme Temps.	
Strategy/Project	Priority
Make free pamphlets on drought and extreme temperatures available at the village office	High
Enhance training and equipment of emergency service personnel	High
Identify vulnerabilities in water supply system leaks, and continue with regular improvements	High
Ensure that critical facilities in the village have appropriate backup generation capabilities.	High
Improve coordination with local and regional power service providers	Moderate
Consider amending local legislation to encourage greater water conservation practices in non and drought emergency times	Moderate
Provide information to residents and businesses regarding water conservation practices	Low

C. Selecting and Prioritizing Mitigation Action

The committee used a benefit cost review to determine the potential benefit a project would have in relationship to the ultimate cost of the project. The benefit/cost categories help determine the economic feasibility of implementing specific mitigation strategies and ultimately identify the required funding for each of the four mitigation objectives studied by the Hazard Mitigation Committee. The village may seek federal, state and other funding to offset the costs of some of the mitigation strategies.

Table 15 – Cost Benefit Analysis Explanation

Benefit Cost Categories

Benefit to Village	Cost to Village	Benefit Cost
High	Low	Low
High	Medium	Medium
High	High	High

In Section IV Part B the committee prioritized the mitigation strategy/project based on the overall impact, or benefit, it would have on the village. In Section IV Part D the committee examined primarily the proposed strategies/projects that received the priority marking of high. The committee weighed the benefit designation next to the estimated cost and created the final list of potential projects.

D. Mitigation Objectives, Strategies, and Benefit Analysis

1. Hazardous Materials

Table 16 – Hazardous Materials Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Assess exposure to hazard event	• Develop a system to monitor storage and movement of hazardous materials. • Identify storm drain outfalls near or along major transportation routes or known hazardous materials sites • Study ability of Croton Pump Station to provide continuous operation during such an event. • Increase traffic enforcement in high risk regions.	• High • Low • Medium • High	The committee found that identifying storm drains was an important part of mitigation based on the July 2004 incident in Ossining when material leaked into the Croton River through storm drains.
Increase the number of structures that can withstands the impact of the hazard	• Enforce compliance with New York State Building Codes. Consider retrofitting of existing critical facilities to withstand impacts associated with hazardous materials spills. • Identify sensitive facilities within the transportation corridors and near known hazardous material sites. In the case of schools and office buildings, request	• High • Medium	

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
	evacuation and emergency plans. • Ensure that hazardous material sites have in place proper spill mitigation and containment measures. • Conduct inspections of sites with or vulnerable to hazardous materials.	• Medium • High	
Improve awareness of the hazard	• Provide information to residents and businesses regarding hazardous material risk and how to respond in the event a disaster occurs. • Encourage residents of single and two-family homes to store and use hazardous materials in a safely.	• Low • Low	Adding links on the Village website to county, state and federal emergency response sites are a cost effective means of distribution.
Enhance response and recovery	• Install additional phone jacks in the Manager's office to enable use of the office as the EOC. • Consider renovations to village Police Headquarters. • Provide emergency service teams and others unable to relocate during hazardous materials events with necessary protective equipment.	• Medium • High • High	These strategies will require partnerships between the village emergency service providers, Westchester County and area municipalities. Grants and other outside funding sources will be required.

2. Flooding, Nor'easter, Hurricane and Severe Storms

Table 17 – Flooding, Nor'easter, Hurricane and Severe Storms Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Assess exposure to severe weather and flooding.	• Continue with Storm Water Drainage projects in problem areas of the village in order to diminish risk of flooding.	• High	The committee translated this strategy directly into a project.
Increase the number of structures that can withstand the impact of severe weather and flooding.	• Remove the Department of Public Works Garage from flood and dam failure zone. Identify appropriate and available properties in the village where the DPW Garage could be located. • Require all new facilities to be constructed according to New York State Building Code for resisting severe weather. • Evaluate ways to minimize or decrease	• High • Low • Low	The committee felt that building and zoning code changes would decrease the number of homes susceptible to flooding. See Project 9.

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
	the number of structures susceptible to flooding.		
Improve awareness.	• Provide information to residents and businesses regarding the risk of severe storms and flooding. Distribute information on damage prevention and emergency response before a disaster occurs. • Develop links off of the Police and Fire Departments' web pages to county, state and federal emergency response sites to help residents prepare for hazardous events.	• Low • Low	Using the village's website is a cost effective means of distribution.
Enhance response, recovery and preparedness.	• Maintain a stock of sand bags to be used in a flooding event and store at the water station and DPW garage. • Obtain materials and equipment for mitigating impact of hazard event and minimizing the discomfort of the public. • Use resources provided by County level emergency response teams. • Consider methods of maintaining electricity is designated locations. • When possible, identify or provide advanced warning to residents if a storm presents particular risks (i.e. tides, snow on roof, snow shoveling). • Encourage residents to react to severe weather in a safe and responsible way.	• Medium • High • Low • Medium • Medium • Low	• Grants and other outside funding sources will be required due to the high cost of implementation of some of the strategies. • See projects 6-8.

3. Fire, Explosion, and Structural Collapse

Table 18 – Fire, Explosion, and Structural Collapse Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Asses exposure to fire, explosion and structural collapse	• Conduct inventory of buildings not meeting current NYS Building Code requirements. • Conduct inventory of sites or facilities that may be prone or vulnerable to explosions.	• High • Medium	
Increase the number of structures that are resistant to fire or collapse	• Consider incentives to encourage the retrofitting of existing buildings within the village Fire Limits to meet current NYS Building Code requirements. • Consider requiring higher standards for	• Low • Low	• Most costs would be borne by private property owners in

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
	fire preventing in new residences.		meeting fire or building code regulations. • See Project 9
Improve awareness regarding fire and structural collapse.	• Enhance fire safety awareness information and make such information more available to local homeowners and businesses via village website and Cable TV. • Enhance building and fire inspections to ensure compliance with applicable building code and fire safety laws. Promote voluntary inspections of buildings, where not required by law, with amnesty provision.	• Low • Medium	The strategies can be low cost, but may require additional administrative commitment from the Engineering Department and the Fire Inspector.
Enhance hazard response, recovery and preparedness.	• Complete renovations of village Police Headquarters. • Encourage and enhance training of Fire Department personnel. • Continue to evaluate roads for emergency vehicle access.	• High • Medium • High	These strategies can be expensive to implement and may require additional capital improvement or budget funding or other outside sources such as state or federal grants.

4. Dam Failure

Table 19 – Dam Failure Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Asses exposure to dam failure	• Hiring a consulting firm to determine accuracy of plan. Revise the plan. • Consider developing an evacuation plan to remove residents from the area. Identify routes and destination shelters or facilities.	• High • High	The committee is still evaluating the best way to approach these projects.
Increase the number of structures that can withstand the impact of dam failure	• Inventory buildings in risk area and evaluate current Dam Failure Emergency Action Plan for accuracy. • Take steps to prevent new construction within the Dam Failure zone indicated by the plan.	• High • High	See Project 9
Improve awareness regarding dam failure	• Consider initial notification of homes at risk with tax bill. • Consider investing in Enhanced 911 to facilitate rapid notification of at risk residents.	• Low • High	

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Enhance hazard response, recovery and preparedness.	• Complete renovations of Police Headquarters. • Enhance training of Fire Department personnel. • Work with State and County officials. The dam and the New York City Water Supply are regulated and protected by the DEC. • Evaluate roads for emergency vehicle access. • Work with the Red Cross to set up evacuation shelter.	• High • Medium • Low • Medium • Low	See Project 7

5. Extreme Temperatures

Table 20 – Extreme Temperatures Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Asses exposure to extreme temperatures	• Study history of hazard events related to extreme temperatures in the area.	• Medium	
Increase the number of extreme temperatures	• Develop a plan to provide backup power to critical facilities.	• Low	See Project 6
Improve awareness regarding extreme temperatures	• Include links on the village web site to weather and health watch web sites and to the County and State's pages on health. • Inform residents of risks. Outline steps to minimize the impact. • Take steps to ensure that children and older residents, who are more susceptible to heat and cold, are aware of risks. When possible provide space in Public buildings for those at risk.	• Low • Low • Medium	See Project 1
Enhance hazard response, recovery and preparedness.	• Complete renovations of Police Headquarters. • Enhance training of Police, Fire and EMT personnel.	• High • Medium	See Project 5

6. Earthquake, Landslide and Tornados

Table 21 – Earthquake, Landslide & Tornado Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Asses exposure to earthquakes,	• Conduct a study of existing structures in the village to determine susceptibility.	• High	

landslides and tornados	• Consider structural risk in village, especially in steep slope regions.	• High	
Increase the number of structures that resist earthquakes, landslides and tornados	• Conduct a study of existing structures in the village to determine susceptibility • Require new construction to conform to the New York State Building Code.	• High • Low	
Improve awareness regarding earthquakes, landslides and tornados	• Raise awareness about the importance of proper maintenance of steep slopes. • Include information about landslides and how to minimize risk on the village web site. • Strictly enforce steep slopes laws and codes. • Use public awareness activities to educate residents on the risk of earthquakes. • Use the building code to encourage earthquake safe new construction.	• Medium • Medium • Low	
Enhance hazard response, recovery and preparedness.	• Complete renovations of Police Headquarters. • Enhance training of Fire Department personnel. • Evaluate roads for emergency vehicle access.	• High • Medium • Medium	

7. Terrorism

Table 22 – Terrorism Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Asses exposure to terrorism	• Conduct discrete inventory of potential terrorist targets within and near the village. Develop appropriate security measures.	• Medium	Terrorism is most likely to occur with no warning and by an unconventional method of attack. In light of that, the committee is more interested in increase awareness of risks in the area. Preparing residents is a primary concern. In addition, the committee plans
Increase the number of structures that are resistant to terrorism	• Improve security measures at emergency response facilities and other sensitive facilities. • Monitor changes in flight paths to Westchester County or other regional airports that may impact the village.	• Low • Medium	
Improve awareness regarding terrorism	• Make information about terrorism available.	• Medium	
Enhance hazard response, recovery and preparedness.	• Complete renovations of Police Headquarters.	• High	

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
	• Enhance training of Fire Department personnel. • Evaluate roads for emergency vehicle access.	• Medium • Low	to make as many educational opportunities available to the first responders.

8. Hailstorm, Ice Storm, and Severe Winter Weather

Table 23 – Hailstorm, Ice Strom and severe Winter Weather Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Asses exposure to severe winter weather	• Conduct a study of existing village facilities to determine risk during severe winter weather. • Conduct a study of existing structures in the village to determine risk during severe winter weather.	• Medium • Medium	
Increase the number of structures that are resistant to severe winter weather	• Update code in order to increase number of structures that can withstand the impact of hazard. • Ensure that all structures, new and old, can withstand accumulation of snow and ice.	• High • High	
Improve awareness of risks associated with severe winter weather	• Post information on the internet and make pamphlets available regarding public heath and safety. • Post information on the internet and make pamphlets available regarding protection of private property against severe winter weather.	• Low • Low	
Enhance hazard response, recovery and preparedness.	• Plan access to public works garage, police station, fire houses and EOC for disaster management.	• Low	

9. Drought and Water Supply Failure

Table 24 – Drought and Water Supply Failure Projects

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
Asses exposure to drought and water supply failure	• Identify vulnerabilities in water supply system leaks, and continue with regular improvements. • Ensure that critical facilities in the village have appropriate backup generation capabilities.	• High • Medium	See project 6
Increase the number of structures that are resistant to drought and water supply failure	• Consider amending local legislation to encourage greater water conservation practices in non- and drought emergency times.	• Medium	See project 10

Mitigation Objectives	*Mitigation Strategy*	*Cost Benefit*	*Notes*
	• Improve coordination with local medical care facilities to determine whether additional support is necessary in the event of extreme temperatures or problem with the water supply. • Improve coordination with local and regional power service providers.	• Low • Low	
Improve awareness of risks associated with drought and water supply failure	• Provide information to residents and businesses regarding water conservation practices. • Make free pamphlets on drought and extreme temperatures available at the village office.	• Low • Medium	
Enhance hazard response, recovery and preparedness.	• Enhance training and equipment of emergency service personnel	• Medium	

E. Potential Project List

The Hazard Mitigation Committee prioritized the potential projects. The committee looked at a number of different criteria (based on the STAPLEE criteria) to prioritize the project lists.

1) **S**ocial: Is the project compatible with the present and future community values?
2) **T**echnical: Is the project feasible with available village resources?
3) **A**dministrative: Does the village have the capability to implement the project?
4) **P**olitical: Is there public support both to implement and maintain the project?
5) **L**egal: Does the village have the authority to implement the project?
6) **E**conomic: Is the project cost effective?
   Cost/benefit analysis (the most benefit from the least amount of money)
   a. Favorable – extremely beneficial results for minimal costs to the village, especially if the project mitigates against a high priority hazard
   b. Fair – ratio is neither good nor bad, meaning the cost is high but the project is necessary for mitigation against a high priority hazard or the cost is low but the project mitigates against a low priority hazard
   c. Unfavorable – the cost to the village greatly exceeds benefits of the project, or cost is to great when considering that the project mitigates against a low priority hazard
7) **E**nvironmental: Does the project concern the environment: land, water, endangered species?

The Hazard Mitigation Committee looked at a variety of projects. Those listed meet most or all of the seven criteria. The projects apply to all types of hazards. These projects are considered overall to be the highest priority based on the priority and cost benefit analysis of each strategies. The committee used the same Cost Benefit Analysis table from Section IV, C to make an analysis of the projects.

Table 25 – Cost Per Benefit Analysis

Cost per Benefit Analysis

Cost to Village	Project Benefit	Cost Benefit
Low	High	Low
Medium	High	Medium
High	High	High

In this section, the Committee lists a comprehensive potential project list. Each project is outlined including a description of the intention of the project, a responsible agency or organization, a list of possible funding sources, and an estimated time of completion based on an unofficial timeline considered by the Committee.

1. Public Education

   Mitigation of almost every hazard begins with the education of the public. The New York State Emergency Management Office distributes brochures that apply to natural hazards such as fire, hurricane and tornado. The American Red Cross has brochures to assist the public in preparing for hazard events. Con Ed has pamphlets on electrical hazards. Croton Volunteer Fire Department organizes Fire Prevention Week in the local schools and educates youth about fire safety at home. The Police Department assists with public education programs in the village about citizen protection and neighborhood watches.

   Education will be an ongoing mitigation effort. Increased awareness of hazard response protocol will help to decrease the fear and anxiety associated with an event. The more information the public has prior to an event, the better the response during and after the disaster.

   Pamphlet distribution has already occurred and brochures remain available in the Village Office. Seasonal hazard warnings (i.e. Christmas Light Safety: Tips to Prevent Fire) are regularly posted on the Fire and Police Department websites, with additional links to county or state prevention tip sites.

   FEMA has in depth mitigation tactics for private homeowners for every hazard addressed in the report. The village is interested in making that information readily available to residents and business owners in the area. Simply linking these pages to the hazard mitigation information already posted on the village website would help educate the public.

   Responsible Party: Public education will be carried out by the Village of Croton-on-Hudson, the Police Department, the Volunteer Fire Department, Con Ed, the American Red Cross, and additional private companies that work with the public.

   Funding: This project will require limited time of village employees, particularly in the police and fire department. The Hazard Mitigation Committee's cost benefit analysis of Public Education found that it is a favorable investment for the village. Most information is readily available either over the internet or in pamphlets that would be made available with little or no cost to the village. This project has a low cost per benefit.

   Timeline: Public awareness has been an ongoing project and will continue to occur.

2. Monitor Trees

Conduct assessment/inspection of trees in the community. Cut down or trim trees that are dead or have loose branches. The village will evaluate only trees on public property in an ongoing effort to keep the trees trimmed. Monitoring trees reduces the potential for utility failure and inconvenience to emergency responders, in addition to making public spaces safer for citizens.

The village does not have the ability to monitor trees on private property, but the village may consider making seasonal recommendations regarding trees in general. The village could encourage residents to check their own dead and diseased trees before winter, and to consider removing trees that may affect utility lines in the event of a natural disaster.

Responsible Party: Con Ed is responsible for tree branches around wires. The Department of Public Works is responsibility for trees on public property.

Funding: The project would be a joint effort between Con Ed and Public Works. This project has a medium cost per benefit for the village. Tree removal will require additional Public Works hours to carry out the maintenance of trees, and the village will have to locate space to store debris from the project. It may become necessary to develop a database of village trees.

Timeline: Although the cost benefit is medium, the project benefit is high. Within the next five years the Committee hopes that a system for implementing tree maintenance will be in place. This project will continue to be discussed in Village Staff meetings.

3. DPW Garage Relocation

Flooding is a concern in the area of the train station parking lot and the DPW Garage. Croton-on-Hudson considers relocation of the garage to be a high priority as the garage houses tools and equipment that would be required for response and recovery efforts in the event of a hazard event.

The village is actively looking for available, affordable locations that would be suitable for the offices and equipment storage. This project will continue until the garage is in a non-flood zone.

Responsible Party: The Board of Trustees and the village staff are responsible for attempting to relocate the garage.

Funding: Relocation will be costly. Funding will be required for the purchase of new property, construction of new buildings, and cost moving. Should an appropriate property come available the village would finance the move. This project has a high cost per benefit. Although relocation is a high priority, the cost to the village will be high.

Timeline: Moving forward is dependent on finding an appropriate property. The project is under constant consideration. It is an immediate priority.

4. Storm Water Management

   Parts of the village have outdated storm water drainage systems that are in desperate need of replacement. Currently the village has applied for funding for replacement of storm water drains in several zones of the village. Some of the intended areas of improvement include locations that suffered severe damage during tropical storms in the past ten years due to insufficient drainage systems.

   The village plans to continue on the course of the storm water drainage system replacement projects. With completion of this report, the village hopes to move forward with this project.

   The Village of Croton-on-Hudson Water Supply Emergency Plan was developed to manage a water emergency. The Plan has procedures for a variety of water related hazard events.

   Following a recent hydro-geologic assessment of the Village's well fields that found no surface water influence on the Village's water supply, the Westchester Dept. of Health has determined that there is no need for Croton to build a filtration system.

   Responsible Party: The Village Engineer, Department of Public Works, and Water Department are responsible for maintenance and replacement. The Village Office secures funding.

   Funding: The cost of replacement is more than the village can take on its own. The village works hard to secure necessary funding through grant programs to make these projects feasible. This project has a high cost per benefit.

   Timeline: Projected completion dates depend on receiving funding. Expected completion of the Harmon Water Project is fall 2005. Other projects have not begun, but the schedule includes annual replacement and improvements over the next ten years.

5. Additional Training and Education

   a. Law Enforcement
   b. Fire Department Volunteers
   c. Emergency Medical Services
   d. Fire/Building Inspectors
   e. Department of Public Works

   Extra training and education for the groups and individuals listed above is considered a valuable use of Village funds. Many of the hazards require response from skilled professionals; likewise, prevention will depend on the knowledge and ability of inspectors and educators. As with project 1, education of the village staff and response volunteers will be a primary form of successful mitigation.

   Law enforcement, fire volunteers and emergency medical volunteers educate, in addition to protect, the citizens of the village. Buildings (new and old) will continue to need inspection in order to keep them up to local standards. The village needs to

allow personnel to take advantage of all opportunities available in order to continue to improve the village's level of resistance to hazard situations. They should be equipped with the best tools for the job.

Responsible Party: The village is responsible for the training of their personnel. Education of first responders is not currently regulated by the village. The education and training of first responders would lead to better response and more lives saved.

Funding: The time and transportation of the personnel, in addition to the cost of courses, are the only expenses. Further education for employees and personnel is a medium cost per benefit.

Timeline: This project is in progress. Further personnel training and education is continually happening to assure preparedness and meet state and federal requirements.

6. Back-up Power Source for the Village Offices and EOC

   The village experiences minor utility failures regularly, and the utility failure of August 2003 reminds the area of the potential severity and risk associated with utility failure. Currently the village and its EOC are in a building that has no back up power. The village determined that it is essential that the building be supplied with back-up power. This project is high priority.

   Responsible Party: The village.

   Funding: Purchase and maintenance of the machine is the only expense. The cost benefit ratio is medium, but is currently part of the budget.

   Timeline: This projected is underway.

7. Identify Location for Emergency Shelters

   Currently the village has no emergency evacuation shelters designated and has no shelter equipment. The village has access to the Town of Cortlandt's Emergency Shelter Trailer, but if the village was involved in large scope event that impacted the entire county or town, the town would have priority use. Attempts to identify schools or public spaces have failed in the past, but the village knows that the identification of a shelter space is an essential future step for preparedness.

   Identify shelters within the village for the public to enter in case of disaster. Make space available for storage of supplies. Work with Red Cross to stock shelter with necessary supplies. The process of identifying shelters will end when there is a sufficient space.

   Responsible Party: The village and American Red Cross are responsible for preparing for potential shelters in the area.

   Funding: There is almost no expense. This project has a low cost per benefit.

Timeline: Within the next ten years (by 2015), the village would like to have identified the appropriate amount of shelter space within the village.

8. Equipment Study

   The village is evaluating all of the equipment in the village to see where there may be deficiencies. This includes vehicles and equipment related to fire department, law enforcement, emergency response, department of public works and any other significant departments. The knowledge of what equipment is available and where to get the equipment if needed can prove to be very important to save lives. Keeping track of what equipment is owned by the village will be an ongoing process.

   Responsible Party: The DPW will collect all of the information and decide where the purchases need to be made.

   Funding: The cost of the equipment would depend on how funding could be acquired either by grants or other public assistance.

   Timeline: All of the departments keep track of the inventories on a regular basis. The project will start with approval of the plan by FEMA.

9. Review Village Building and Zoning Code

   The zoning code regulates the use, intensity and pattern of development in the Village. The building code regulates the construction and renovation of new and existing structures.

   In the last, ten years the village has been almost entirely built out. At this point in time, re-evaluating the current code, and modifying where necessary, is a valuable endeavor in the effort for hazard mitigation. The zoning and building code requirements will be integrated into the plans for new and existing buildings, as appropriate, and will bring more buildings up-to-date with fire regulations and safety as applications for renovations are made.

   The policies of the Hazard Mitigation Plan will be considered as the village code is revised. Code changes will affect all new construction, and any renovation in the village.

   Responsible Party: The Village Engineer's Department and the Comprehensive Planning Committee.

   Funding: Zoning Code changes require the dedication and time of a large group of people, but changes in the code are the best way to ensure mitigating precautions are included in construction and renovation of new and existing buildings. The project has a medium cost per benefit.

   Timeline: The zoning code complete revision in 2005. Within the next 5 years, a new committee will be formed to begin new development and revision.

10. Communications Plan

Because of the topography of the Village, emergency responders, including DPW workers, have difficulty staying in contact with central dispatchers.

Communications has always been a major issue during a disaster. The first responders and important agencies need to be able to communicate to each other in order to effective and efficiently manage a scene, and the responders need the ability to contact citizens quickly and efficiently. Reverse 911 is one application to explore.

Responsible Party: The Police and Fire Department would have to evaluate their needs, and the Village will need to consider alternatives to the existing service.

Funding: The village may be able to defray the cost of new and effective communication systems by partnering with area service providers. This is an important project. It has a medium, possibly low, cost per benefit.

Timeline: The police department is working on a communication update project. The fire department is working on updating their communication. The project will be complete in the next 5 years.

F. Completed Hazard Mitigation Projects

The details of completed hazard mitigation projects will be recorded in this section. Each hazard summary includes:

- Project Title
- Responsible Agency
- Date of project approval, start and completion
- Project description (including list of supporting agencies)
- Project activity summary
- Total cost and cost break down (village contribution, supporting funds)

G. Project Impact on New or Existing Buildings and Infrastructure

The tables below indicate the impact of the projects in Section IV, Part C on new or existing building/infrastructure in the case of each of the hazard events listed in Section III, Part C.

+	Positive impact	N	New buildings/infrastructure
/	No significant impact	E	Existing buildings/infrastructure

Table 26 – Impact of Natural Disaster Mitigation Projects on New/Existing Buildings/Infrastructure

Natural Disasters																		
HAZARDS	Drought		Extreme Temps.		Severe Winter Storm		Hailstorm		Ice Storm		Severe Storm		Hurricane, etc.		Flood, Dam Failure		Earthquake, Landslide	
PROJECTS	N	E	N	E	N	E	N	E	N	E	N	E	N	E	N	E	N	E
Public Education	+	+	/	/	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Monitor Trees	/	/	/	/	+	+	+	+	+	+	+	+	+	+	+	+	+	+
DPW Garage Relocation	/	/	/	/	/	+	/	/	/	/	/	+	/	+	/	+	/	/
Storm Water Management	/	/	/	/	+	+	/	/	/	/	+	+	+	+	+	+	+	+
Training and Education	/	/	/	/	+	+	/	/	/	/	+	+	+	+	+	+	/	/
Back-up Power	/	/	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Emergency Shelter	+	+	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Zoning Code Modifications	/	/	/	/	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Communications Plan	/	/	/	/	/	/	/	/	/	/	/	/	+	+	+	+	+	+

Table 27 – Impact of Human Caused Disaster Mitigation Projects on New/Existing Buildings/Infrastructure

Human Caused Hazards																		
HAZARDS	Fire, Struct. Collapse		Explosions		Haz-Mat In-Transit		Haz-Mat Fixed-site		Oil/Gasoline Spill		Utility Failure		Terrorism		Trans. Accidents		Epidemic	
PROJECTS	N	E	N	E	N	E	N	E	N	E	N	E	N	E	N	E	N	E
Public Education	+	+	/	/	+	+	+	+	+	+	+	+	+	+	/	/	/	/
Monitor Trees	/	/	/	/	/	/	/	/	/	/	+	+	/	/	/	/	/	/
DPW Garage Relocation	/	/	/	/	/	+	/	+	/	+	/	+	/	+	/	/	/	/
Storm Water Management	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Training and Education	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Back-up Power	/	/	/	/	/	/	/	/	/	/	+	+	+	+	/	/	/	/
Emergency Shelter	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Zoning Code Modifications	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Communications Plan	/	/	/	/	/	/	/	/	/	/	/	/	+	+	/	/	/	/

*Projects were developed based on the analysis of individual strategies. One project may apply to several hazards and therefore embody multiple strategies. The impact of strategies on the new and existing structures is in Section B, and a cost benefit analysis of each strategy can be found in Section C.

**Projects are further discussed in Section D, including a cost benefit analysis.